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ABSTRACT

This report is based on a longitudinal analysis of physical-contact interaction of mother-infant pairs throughout the first year of life. The sample consisted of 26 middle-class mother-infant pairs who were observed in their homes for four hours once every three weeks. During each visit, the observer made a running record of everything that happened when the infant was interacting with another person. The report focuses on the data on pick-ups by the mothers. The infant measures examined positive and negative responses to being held and positive and negative responses to being put down. The maternal measures examined tender, careful holding, inept holding, and affectionate behaviors. Findings suggest that initial constitutional differences in infants' responses to contact are overridden by the influence of maternal behavior and that tender, careful holding is most clearly associated across time with positive infant response to being held. The amount of time the mother held the baby does not seem to influence the child's positive response as much as the way she holds him. Finally, babies who show most enjoyment of close bodily contact with their mothers do not become addicted to it, but are the very ones who became increasingly content to be put down. (JMB)

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DEVELOPMENTAL CHANGES IN THE BEHAVIOR OF INFANTS AND THEIR MOTHERS RELEVANT TO CLOSE BODILY CONTACT*

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Mother-infant interaction relevant to close bodily contact has been given scant research attention by students of human behavior, despite the fact that it has been focal in studies of other primate species. Therefore, the research that we are going to report today is perhaps best viewed as a pioneer study. It is based on a longitudinal analysis of physical-contact interaction of mother-infant pairs throughout the first year of life in the natural environment of the home. This report cannot be comprehensive. It will merely hit some high spots of an analysis that we had hoped to be able to report more fully at this meeting.

Method

I am going to skip quickly over those parts of our method which may be familiar to you through our publications. The sample consists of 26 white, middle-class mother-infant pairs living in the Baltimore area. Observations were carried out in the course of home visits once every 3 weeks, from 3 to 54 weeks after the baby's birth, each visit lasting approximately 4 hours. There were 4 visitor-observers in all, each of whom followed his assigned cases throughout the baby's first year. The observers made a running record of what happened during the visit, especially everything that occurred when the infant was interacting with another person. After the visit the observer dictated from his notes a narrative account of what had transpired during the visit. It is these narrative records that constitute our raw data.

Our analysis of physical-contact interaction began with coding every instance in which a baby was picked up by another person, under what circumstances the pick-up took place, how he responded to it, what both he and the adult did during the episode of holding, and what he did when he was subsequently put down. This report is confined to pick-ups by the mother. The coding was done by a variety of student assistants who worked without knowledge of any other assessments of the sample, and who were trained until they reached a satisfactory degree of reliability. We derived several measures of infant behavior from this coding, and a substantially larger number of maternal measures. I shall describe these measures in the course of presenting our results.

I shall refer only in passing to the developmental changes that take place in regard to the individual measures. I shall focus on the interrelationships among the measures, and how, over time, maternal and infant behavior appear to influence each other.

Results

Let us first consider four measures of infant behavior. First, positive response to being held. This is the percentage of pick-up episodes in which a baby smiled or moulded his body to that of his mother, or later on, showed

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PS 008179

active behaviors such as embracing her. Incidentally, we found that all of the infants in our sample were at the beginning capable of a positive response to being held. If in doubt we picked the baby up ourselves to see whether he could adjust his posture to the body of the person who held him. We found the mean score for each infant for each quarter of the first year. On the average, positive responses to holding occurred in 15% of pick-up episodes in the first quarter, and then increased to about 40% from then on.

Some responses to being held were identified as negative--those in which the baby cried, stiffened, squirmed, or later, pushed away or hit at the mother. In the first quarter negative responses were about as frequent as positive, but from then on were substantially less frequent.

A positive response to being put down was scored when the baby either smiled or was otherwise described by the observer as being happy. These were rare in the first quarter, but occurred, on the average, in 62% of the put-down episodes in the fourth quarter. A check showed that in half of these positive responses in the fourth quarter the babies turned immediately to autonomous exploratory play. A negative response to put-down was scored when a baby cried or later, made clear gestures that he wanted to be picked up again. These occurred in 45% of the episodes in the first quarter, and then became less frequent.

As an example of the intercorrelations among these infant measures, the FIRST SLIDE shows the matrix for the second quarter. The chief point of interest here is that babies who often respond positively to being held tend also to respond positively to being put down, whereas this is not so with babies who often respond negatively to being held. This interrelationship holds good in each quarter, including even the first. We attach considerable importance to this finding. Babies who show most enjoyment of close bodily contact with their mothers do not become addicted to it, they are the ones who are content to be put down and who by the end of the first year tend to move off into independent activity.

How were these responses to close bodily contact related to the mother's behavior? I am going to focus on three measures of maternal behavior in this report--the three that throughout the first year showed the closest relationship to infant measures.

The first of these we have labelled tender, careful holding because it did remind us of TLC, despite the cliché. This behavior was characterized both by a gentle muting down of the mother's usual speed and vigor of movement and by a pacing of the tempo of her physical handling of the infant to his tempo of response. On the average, tender, careful holding occupied about one-third of the total holding time during the first quarter, and then gradually declined.

The second measure is labelled inept holding. It is the percentage of holding time in which the mother handled her baby abruptly, roughly, or very inappropriately. Our prize example of inept holding was when one mother held her baby upside down for some time without seeming to notice that the feet were where the head should have been. This was less common than tender, careful holding, accounting for about 19% of holding time in the first two quarters, on the average, and then decreasing.

The third measure is affectionate behavior, which was defined as hugging, kissing, or caressing. The measure was the percentage of pick-up episodes in which such behavior occurred. The average mother was affectionate in 12% of

pick-up episodes in the first quarter, and in about 18% throughout the rest of the year.

Within each quarter we found strong and significant relationships between maternal behavior and the way in which babies responded to being held and to being put down. Since our time is limited I am going to show you our data just for the third quarter, which gives a pretty fair representation of relationships that hold throughout the first year. The interrelationships are summarized in the NEXT SLIDE which shows a plot of the two factors that emerged from a factor analysis of the intercorrelations of maternal and infant behaviors in the third quarter. This plot shows several measures that I haven't mentioned before. I draw your attention to two of these. Look at Factor II, represented by the vertical axis of the plot. This seems to be a quantitative dimension, defined by the duration of maternal holding, that was measured in minutes per hour, and by the mean duration of a pick-up episode. You will note that these are essentially unrelated to the infant behavioral measures, all of which are aligned on the horizontal axis that represents Factor I. Here on the horizontal axis the qualitative maternal measures are aligned. Here, toward the left, we find tender, careful holding and affectionate pick-ups, clustered with infant positive responses to being held and positive responses to being put down. Here, on the right, toward the opposite pole, we find inept holding clustered with infant negative responses to being held and to being put down. Apparently, it is how the mother holds her baby that is related to how the baby behaves in close bodily contact, rather than how much or how long she holds him, at least within the durational limits represented in this sample.

Of course, a factor plot such as this does not indicate direction of effects any more than does a single correlation coefficient. Does a mother hold her baby tenderly because he responds positively? Or does a baby respond positively because of his mother's tender, careful handling?

In an attempt to answer questions such as these, we considered two sets of cross-quarter correlation coefficients. The first set deals with the stability or consistency of behaviors across the four quarters of the first year. I haven't time to show you slides, but this is the story. First-quarter infant behavior is essentially unrelated to infant behavior in later quarters. Initial individual differences did not persist in our sample. But how a baby responds in the second quarter does seem to be predictive of how he will respond throughout the rest of the first year. On the other hand, the maternal measures show a high degree of consistency throughout the first year. Individual differences in mothers remain fairly stable from the beginning, whereas individual differences in infants only become stable after the first three months.

The other set of cross-quarter correlations are of pairs of maternal and infant behaviors. The NEXT SLIDE shows the relationships between maternal tender careful holding and infant positive response to being held. The upper right half of the matrix contains the coefficients of correlation between maternal behavior in earlier quarters and infant behavior in later quarters. It may be seen that these are all positive and significant. It appears that tender, careful holding in any one quarter is associated with positive infant response in all subsequent quarters. The lower left-hand half of the matrix contains the correlations between infant behavior in earlier quarters and maternal behavior in later quarters. These are lower, and only one is high enough to be significant. From this we infer that maternal tender, careful

holding has a stronger influence upon infant response later on than an infant positive response has upon the mother's subsequent tendency to handle her baby tenderly and carefully.

Another picture is yielded by the next pair of behaviors--the percentage of pick-up episodes in which the mother displayed affectionate behavior and infant positive response to being held. NEXT SLIDE. Here we see that the correlations in the upper right-hand half of the matrix are low. It does not seem that maternal affectionate display in earlier quarters facilitates positive infant response later on. Now turn to the lower left-hand half of the matrix. First, note that none of the correlations of infant first-quarter behavior with later maternal behavior are high enough to be significant. Infant positive response in the first quarter does not seem to induce the mother to behave more affectionately as time goes on. But from the second quarter on it would seem that infant positive response to being held does seem to strengthen the mother's tendency toward affectionate display.

Finally, let us consider the relation between inept maternal handling and infant negative response to being held. NEXT SLIDE. The correlations in the upper right-hand portion tend to be substantial and significant, suggesting that mothers who handle their babies ineptly earlier on tend to have babies who in later quarters respond negatively to being held. Turning to the lower left-hand portion of the matrix, you will note that an infant's negative responsiveness in the first quarter is not significantly related to how inept his mother is in later quarters. However, negative responses in the second and third quarters are strongly associated with later maternal ineptness in holding. It appears that a vicious spiral has been built up so that maternal ineptness and negative infant response seem reciprocally related. Nevertheless, there is some reason to believe that the mother began the vicious spiral by her inept handling in the infant's earliest months.

Discussion

I regret that this has had to be an over-simplified version of our findings. The processes which underlie the relations between maternal and infant measures really become clear only after an examination of material that I have had to omit today. Nevertheless, I should like to state several conclusions.

First, initial constitutional differences in infants' responses to contact seem to be overridden by the influence of maternal behavior--at least in this sample of babies all of whom were normal at birth and capable of a positive response to close bodily contact.

Second, tender, careful holding, of all the various measures of maternal behavior that we examined, seemed most clearly associated across time with positive infant response to being held. I am especially interested in this because this behavior clearly implies maternal sensitivity to infant behavioral cues. In each of the various data analyses we have completed--whether of infant crying, early feeding interaction, responses to everyday separations and reunions, or face-to-face interaction--it emerged that the key maternal behavior associated with the development of positive social responsiveness in the infant reflected sensitive and flexible maternal response to infant behavioral cues.

Third, within the limits of amount of holding represented in this sample it did not seem to be how much the mother held the baby that mattered as how

she held him. I could not give you the complex evidence for it--but we are convinced that the sensitivity to infant cues implicit in good quality holding includes sensitivity to cues of when the baby is ready to be put down. This, we believe, explains the fact that babies who respond positively to close bodily contact with their mothers tend increasingly over the first year to accept being put down.

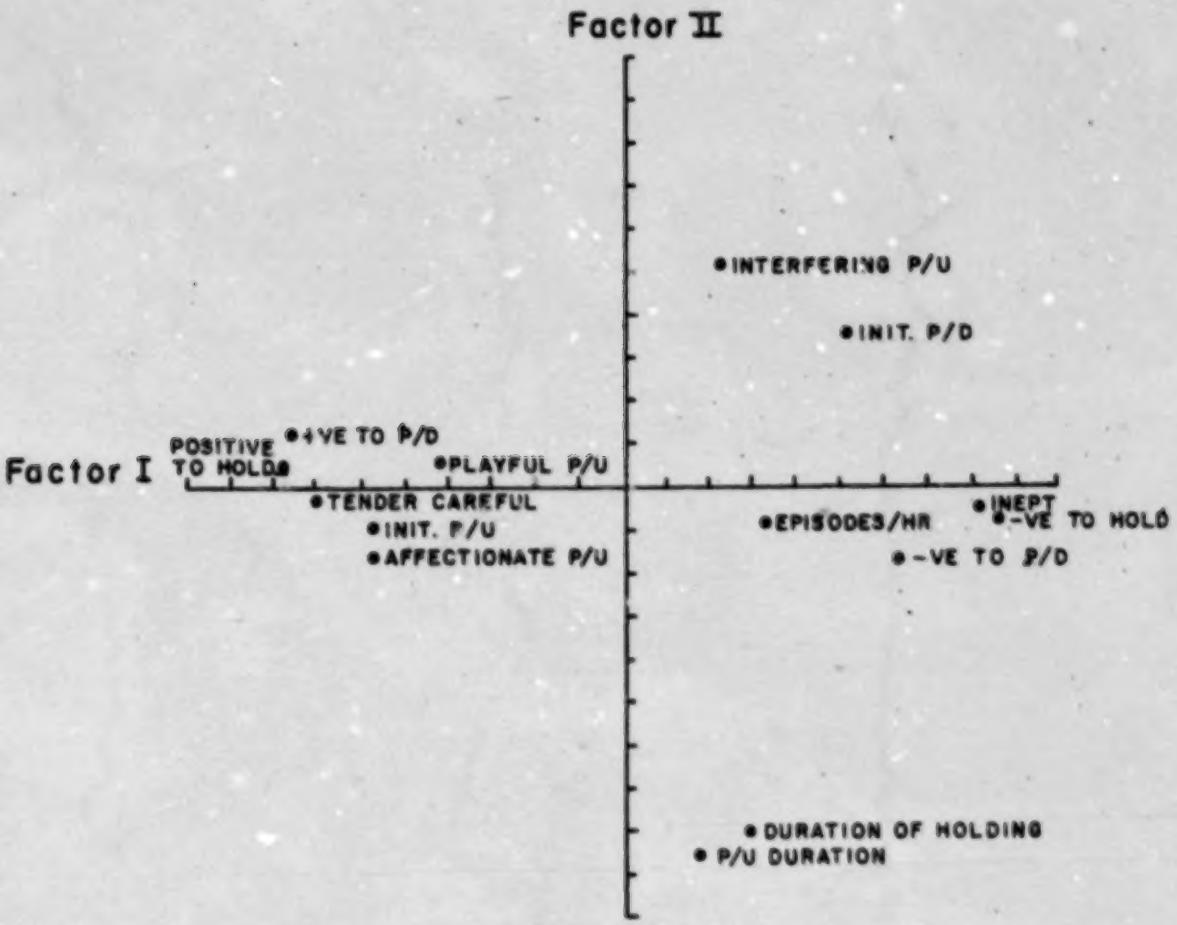
This leads to our final point, which opposes the popular assumption that to accede to an infant's desire for close bodily contact by picking him up will make him clingy and interfere with the development of later independence.

INTERCORRELATIONS OF INFANT BEHAVIORS IN SECOND QUARTER

	POSITIVE TO HOLD	NEGATIVE TO HOLD	POSITIVE TO P/D
NEGATIVE TO HOLD	-.64**	---	
POSITIVE TO P/D	.77**	-.56**	---
NEGATIVE TO P/D	-.45*	.30	-.63**

** $P < .01$ * $P < .05$

Factor Loadings of Third Quarter Maternal and Infant Behaviors



INFANT NEGATIVE RESPONSE TO HOLDING

		1ST Q	2ND Q	3RD Q	4TH Q
INEPT	1ST Q	---	.42*	.56**	.24
MATERNAL	2ND Q	.11	---	.73**	.35
HOLDING	3RD Q	.22	.80**	---	.47*
	4TH Q	.24	.48*	.53**	---

**P<.01 *P<.05

INFANT POSITIVE RESPONSE TO HOLDING

		1ST Q	2ND Q	3RD Q	4TH Q
TENDER	1ST Q	---	.51**	.53**	.46*
CAREFUL	2ND Q	.28	---	.69**	.67**
MATERNAL	3RD Q	.38	.41*	---	.44*
HOLDING	4TH Q	.26	.25	.25	---

**P<.01 *P<.05

INFANT POSITIVE RESPONSE TO HOLDING

		1ST Q	2ND Q	3RD Q	4TH Q
% OF PICK-UPS	1ST Q	---	.13	.19	.22
IN WHICH	2ND Q	.32	---	.33	.36
MOTHER SHOWS	3RD Q	.36	.49*	---	.44*
AFFECTION	4TH Q	.28	.41*	.51**	---